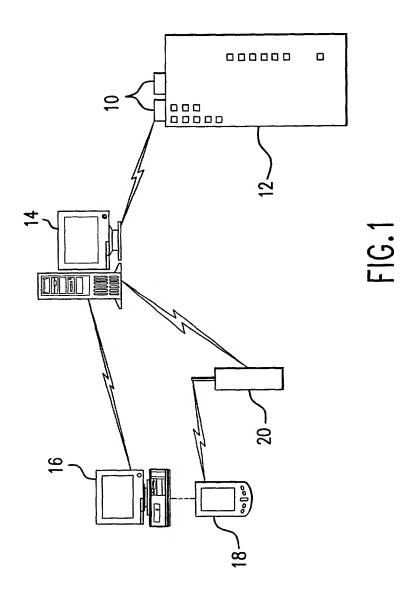
Lawrence J. Seigel "METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY OF AN AIR CONDITIONING APPARATUS"

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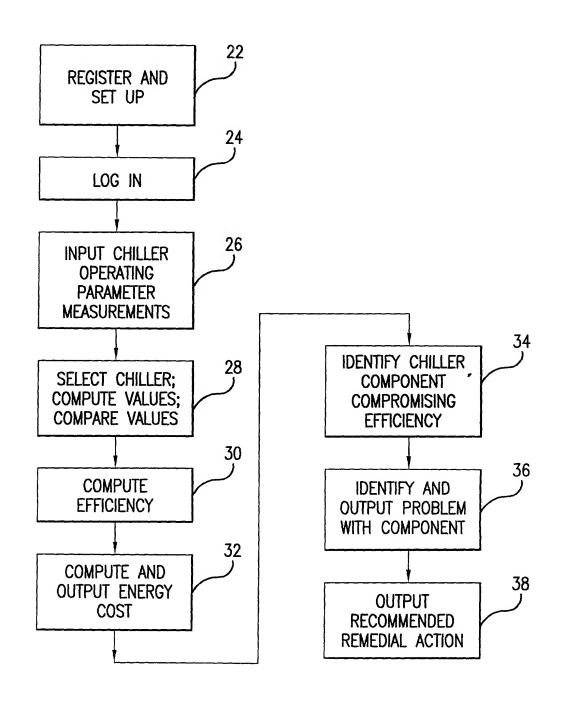


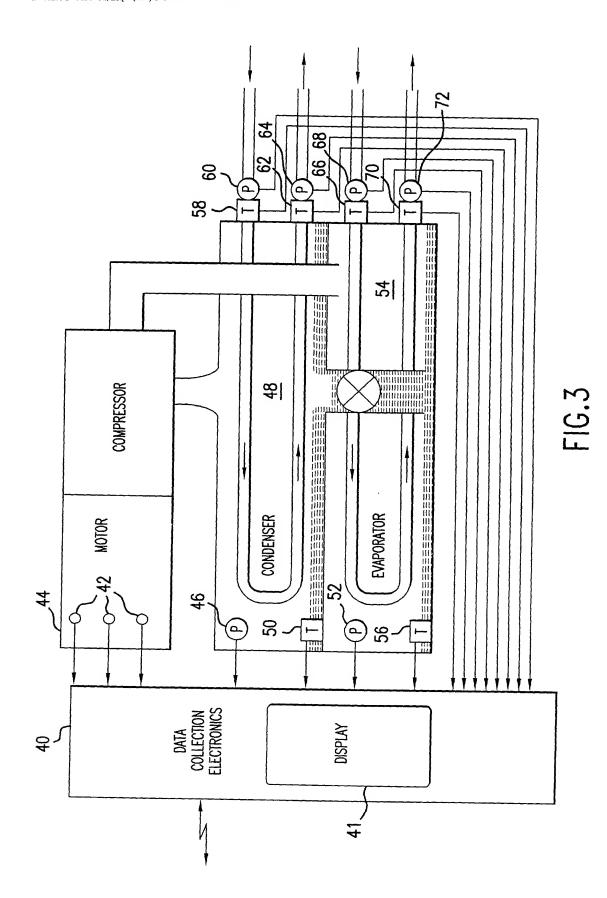
FIG.2

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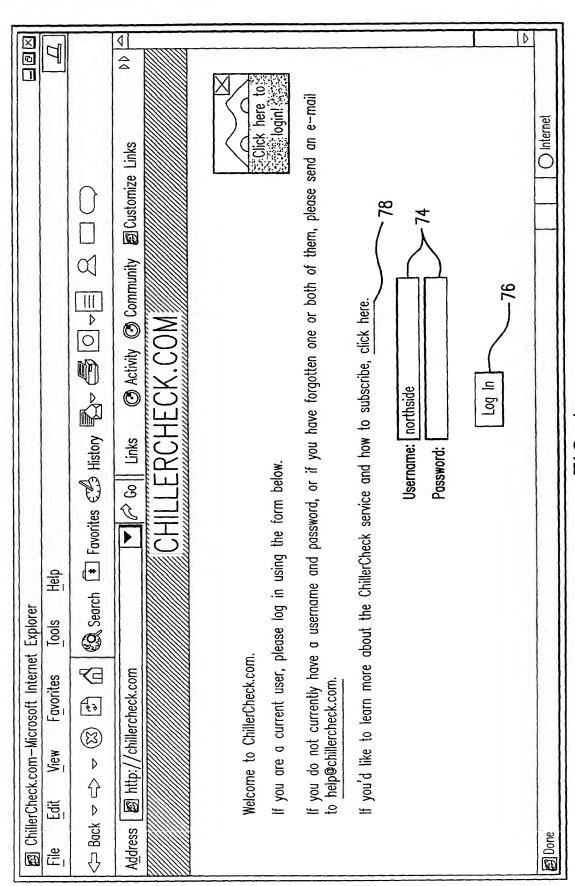
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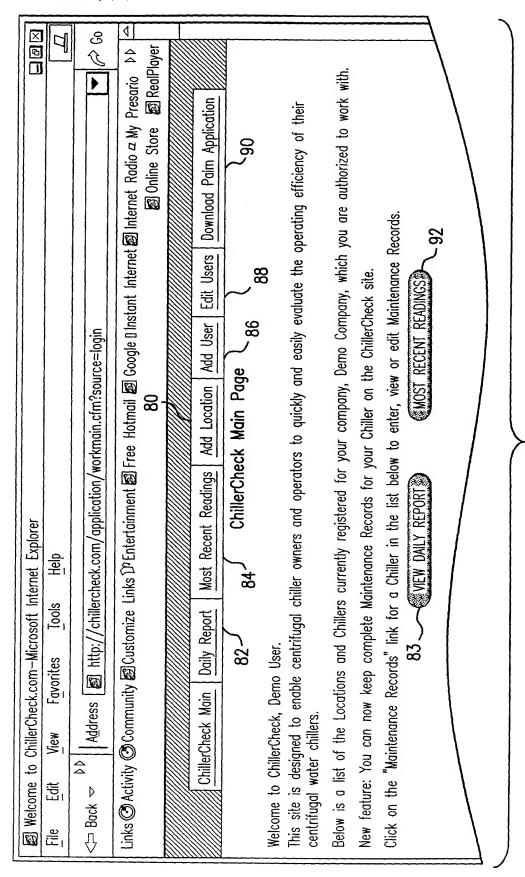
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CONT'D ON FIG.5-1

FIG.5

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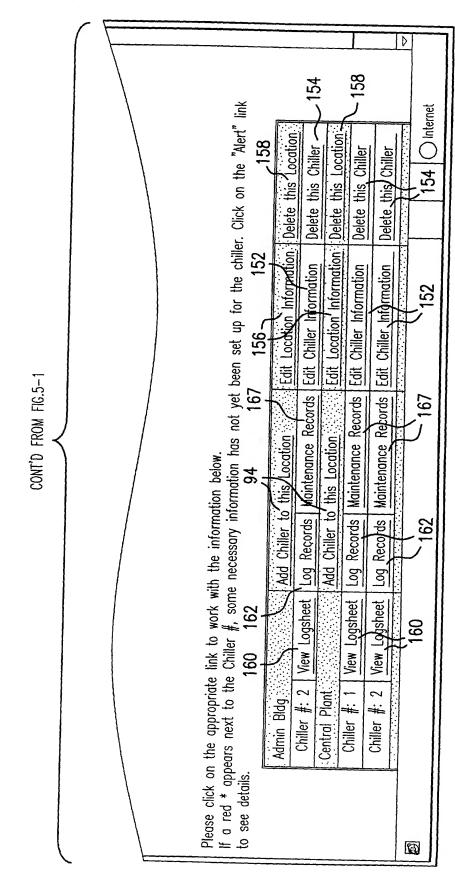


FIG. 5-

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	ChillerCheck	Daily	Most Recent	Add	Add	Edit	Download Palm	
	Main	Report	Readings	Location	User	Users	Application	
82 / 84		Add a Chiller a	t Atlanta Offic 80	e Bldg.	86	88	€ 90	

Please fill in all information in the form below, then click the "Add Chiller" button.

You will then be taken back to the ChillerCheck Main page, where you can work with any of your Location, Chiller or Chiller Log records.

Note: If you do not have all the information below available at this time, you can still add the Chiller by filling out only the required information (marked with an \* below) now. You can come back later and add the rest of the information. However, you will not be able to make efficiency calculations or graph trends until all Chiller information has been recorded.

Chiller Information

(Help!) * Chiller #:	96
* Make:	Choose a Make → 98
(Help!) * Model:	
(Help!) Serial #:	
(Help!) * Refigerant Type:	Choose a refrigerant   → 104
(Help!) Year Chiller Was Manufactured:	Choose a year of manufacture → 106
* Efficiency Rating (kw/ton):	
(Help!) *Energy Cost (\$/kw hour):	

FIG. 6A

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Help! \_112 \* Weekly Hrs. of Operation: 114 \* Weeks Help! Per Year of Operation: Help! \* Average Load Profile: -116 118 \* Tons: (Help!) 120 (Help! \* Design Voltage: 122 Full-Load Help!) Amperage: Now we need some information about the Condenser. (Help!) Design Choose a pressure unit Condenser Water Pressure Drop: 126 124 (This value may be omitted if necessary, but your calculations will be more accurate if you have it. If you enter a value, you must choose a unit of measure.) Choose a pressure unit Please (Help!) choose a unit of measurement for the Actual Condenser Water Pressure Drop: Choose a pressure unit > 130Please | Help! choose a unit of measurement for Condenser Pressure: Design Condenser -132Approach Temp: (This Value may be omitted if you do not have it.) FIG. 6B

का सुबंध कर

Now we need some information about the Evaporator.						
Chill Water Pressure Drop: (This value may be omitted if necessary, but your calculations will be more accurate if you have it. If you enter a value, you must choose a unit of measure.)	Choose a pressure unit □  134  136					
choose a unit of measurement for the Actual Chill Water Pressure Drop:	Choose a pressure unit  ▽ 138					
(Help!) Please choose a unit of measurement for Evaporator Pressure:	Choose a pressure unit   → 140					
Design Evaporator Approach Temp: (This value may be omitted if you do not have it.)	142					
(Help!) Evaporator Design Outlet Water Temp:	144					
Please choose a me	ethod of calculating Oil Pressure Differential for the Compressor.					
(Help!) Calculate Differential by:	Choose a method  ▽ 146					

FIG. 6C

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"METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY
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There are	g just a few more things we need to know about this chiller.			
Does the chiller have a readout for Purge Run Time?	Yes No No			
If so, is the Purge Run Time measured only in minutes, or in both hours and minutes?	Minutes Only O Hours and Minutes  145			
Please set a maximum amount of Purge Run Time per day you wish to allow before you are sent an alert.	Minutes 147			
Does this chiller have a readout for Bearing Temperature?	Yes No 149			
Operator Notes: (Enter any notes you might want to record about this chiller.)	150 148 ✓			
Add Chiller Info				

FIG. 6D

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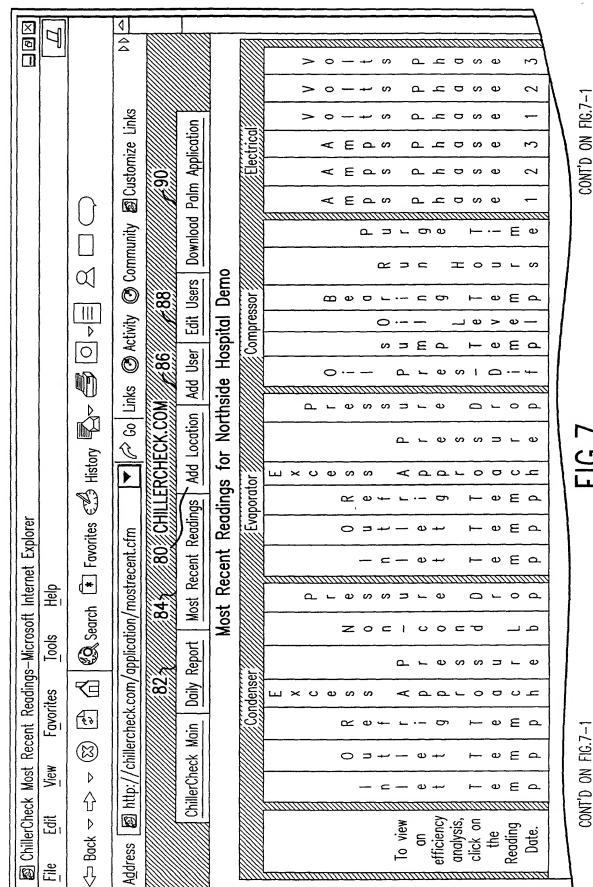
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CONT'D ON FIG.7-1

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CONT'D FROM FIG.7   CON	vience D. Maxw	well, Esq. (404) 688-0770 Sheet 12 of 27	
11. Province Plant Chiller #: 1  12. Main Chiller Plant Chiller #: 1  13. Main Chiller Plant Chiller #: 2  14. Main Chiller Plant Chiller #: 2  15. Main Chiller Plant Chiller #: 2  16. Main Chiller Plant Chiller #: 3  17. Main Chiller Plant Chiller #: 3  18. Main Chiller Plant Chiller #: 3  18. Main Chiller Plant Chiller #: 3  19. Main Chiller Plant Chiller #: 3  19. Main Chiller Plant Chiller #: 3  19. Main Chiller Plant Chiller #: 3  10. Main Chiller Plant Chiller #: 3  10. Main Chiller Plant Chiller #: 3  11. Main Chiller Plant Chiller #: 3  12. Main Chiller Plant Chiller #: 3  13. Main Chiller Plant Chiller #: 3  14. Main Chiller Plant Chiller #: 3  15. Main Chiller Plant Chiller #: 3  16. Main Chiller Plant Chiller #: 3  17. Main Chiller Plant Chiller #: 3  18. Main Chiller Plant Chiller #: 3  19. Main Chiller Plant Chiller #: 3  10. Main Chiller Plant Chiller #: 3  10. Main Chiller Plant Chiller #: 3  10. Main Chiller Plant Chiller #: 3  11. Main Chiller Plant Chiller #: 3  12. Main Chiller Plant Chiller #: 3  13. Main Chiller Plant Chiller #: 3  14. Main Chiller #: 3  15. Main Chiller Plant Chiller #: 3  16. Main Chiller Plant Chiller #: 3  17. Main Chiller Plant Chiller #: 3  18. Main Chiller Plant Chiller #: 3  18. Main Chiller Plant Chiller #: 3  19. Main Chiller Plant Chiller #: 3  19. Main Chiller Plant Chiller #: 3  10. Main Chiller Plant Chiller #: 3  10. Main Chiller #: 3  11. Main Chiller Plant Chiller #: 3  12. Main Chiller #: 3  13. Main Chiller #: 3  14. Main Chiller #: 3  15. Main Chiller #: 3  16. Main Chiller #: 3  17. Main Chiller #: 3  18. Main Chiller #: 3		<u>nanahaininininininininahaininininininini</u>	
71 TP   74.0   81.0   82.0   0.0   4.0   1.8   10.0   49.0   39.0   38.0   0.0   -16.0   10.0   25.8   140   50   123   123   620   620   620   480   620			
The Main Chiller Plant Chiller #: 1  The Main Chiller Plant Chiller #: 1  The Main Chiller Plant Chiller #: 2  The Main Chiller Plant Chiller #: 2  The Main Chiller Plant Chiller #: 3  The Main Chiller Plant Chiller #: 4  The Main Chiller	[3]		ig
11 TP 74.0 81.0 82.0 0.0 4.0 1.8 10.0 4.0 39.0 38.0 0.0 -16.0 10.0 25.8 14.0 50 12.3 12.3 62.0 62.0 62.0 62.0 62.0 62.0 62.0 62.0	₹ /		#
The Main Chiller Plant Chiller # 1	£ /	000	$\square$
The Main Chiller Plant Chiller # 1	O'TNC	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
1. Main Chiller Plant Chiller #: 1  1. Main Chiller Plant Chiller #: 3  1. Main Chill	$\Xi$	620	
11. Main Chiller Plant Chiller #: 1  12. Main Chiller Plant Chiller #: 1  13. TP 78.0 82.0 84.0 0.3 10.0 7.1			
11. Main Chiller Plant Chiller #: 1  12. Main Chiller Plant Chiller #: 1  13. TP 78.0 82.0 84.0 0.3 10.0 7.1		35 35 35	
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CONT'D FROM FIG.7  11. Main Chiller Plant Chiller # 1  12. Tp 74.0 81.0 82.0 0.0 4.0 1.8 10.0 49.0 39.0 38.0 0.0 -16.0 10.0 25.8 1  13. Tp 74.0 81.0 82.0 84.0 0.3 10.0 7.1 50.0 44.0 42.0 0.0 -12.0 17.5 17.5 18.0 Chiller Plant Chiller # 3A  13. Tp 73.7 80.7 81.0 0.0 -0.5 -0.2 47.8 38.0 36.0 0.5 -8.8 19.5 18.5 18.5 18.5 18.5 18.5 18.5 18.5 18			
n: Main Chiller Plant Chiller #: 1  n: Main Chiller Plant Chiller #: 1  n: Main Chiller Plant Chiller #: 2  n: Main Chiller Plant Chiller #: 34			
n: Moin Chiller Plant Chiller #: 1  Noin Chiller Plant Chiller #: 1  Noin Chiller Plant Chiller #: 2  1 TP 74.0 81.0 82.0 84.0 0.3 10.0 7.1		andigitalitaita kilintaitaitak kilintaitai	
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n: Main Chiller Plant Chiller #: 1  Nain Chiller Plant Chiller #: 1  Nain Chiller Plant Chiller #: 2  Ni Main Chiller Plant Chiller #: 34	1	10 10 10 10 10 10 10 10 10 10 10 10 10 1	
CONT'D FROM FIG.7  n: Main Chiller Plant Chiller #: 1  N: Main Chiller Plant Chiller #: 2  1) TP 74.0 81.0 82.0 0.0 4.0 1.8 10.0 49.0 39.0  N: Main Chiller Plant Chiller #: 3  n: Main Chiller Plant Chiller #: 3A  n: Main Chiller Plant Chiller #: 3A  n: Main Chiller Plant Chiller #: 3A  ss: ss: ss: ss: ss: ss: ss: ss: ss: ss	1		
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n: Main Chiller Plant Chiller #: 1  Nain Chiller Plant Chiller #: 1  Nain Chiller Plant Chiller #: 2  N: Main Chiller Plant Chiller #: 3  N: Main Chiller Plant Chiller #: 3A			
CONT'D FROM FIG.7  n: Main Chiller Plant Chiller #: 1  11 TP 74.0 81.0 82.0 0.0 4.0 1.8 10.0 4.0 1.8 10.0 4.0 1.8 10.0 4.0 1.8 10.0 4.0 1.8 10.0 1.			
CONT'D FROM FIG.7  n: Main Chiller Plant Chiller #: 1  ss.  N. Main Chiller Plant Chiller #: 2  11 TP 78.0 82.0 84.0 0.3 10.0 7.1  ss.  n: Main Chiller Plant Chiller #: 3A  n: Main Chiller Plant Chiller #: 3A  n: Main Chiller Plant Chiller #: 3A  ss.  ss.  ss.			
CONT'D FROM FIG.7  n: Main Chiller Plant Chiller #: 1  ss.  n: Main Chiller Plant Chiller #: 2  11 TP 78.0 82.0 84.0 0.3 10.0  N Main Chiller Plant Chiller #: 3A  n: Main Chiller Plant Chiller #: 3A  n: Main Chiller Plant Chiller #: 3A  ss. ss.			
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CONT'D FROM FIG.7  Location: Main Chiller Plant Child By 24/01 TP 74.0 81.0 82.0  8/24/01 TP 74.0 81.0 82.0  10.8%  Location: Main Chiller Plant Child Child Child Childer Plant Child Childer Plant Child Childer Plant Child Child Childer Plant Child Child Childer Plant Child Child Child Childer Plant Child Child Child Childer Plant Child Chi		0.00	
CONT'D FROM FIG.  Location: Main Chiller Plan 8/24/01 TP 74.0 81.0 8 9:08 AM Eff. Loss: 7 Load: 57.9% 8/21/01 TP 78.0 82.0 8 88/21/01 TP 78.0 82.0 8 87.0% 7 Load: 66.7 Shann Chiller Plan 8/21/01 TP 73.7 80.7 8 87.0%	7	4 t t 2 c c c c c c c c c c c c c c c c c	
CONT'D FROM Location: Main Chiller 8/24/01 TP 74.0 81 9:08 AM Eff. Loss: 7, Load: 57.9% 8/21/01 TP 78.0 83 35.6% 7, Load: 8/21/01 TP 78.0 87 87.0% 87.	FIG.	P S S S S S S S S S S S S S S S S S S S	
CONT'D  Location: Main C  8/24/01 TP 74, 9:08 AM Eff. Loss: 7 Load: 57.9% 10.8% 57.9% 10.8% 57.9% 10.8% 57.9% 10.8	FROM		
CON CON CONTROL OF THE STATE OF	1,0	gin C 3 73.	
10catio   10ca	00	N TO M SS S	
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ය Ю D e s B RealPlayer e o o = 7 CONT'D ON FIG.8-1 Links @ Activity @ Community @ Customize Links D'Entertainment @ Free Hotmail @ Google 🛭 Instant Internet @ Internet @ Internet Radio a My Presario e s a Trends e s a  $\sim$ Donline Store Chart e s a P 7 Eds e s a Eds View Logsheet **∞** ¬ ⊏ 0 3 7178 Compressor Main Page | Maint. Records Add Maint. Record | Add Log Record دە بـــ 0 --Admin Bldg s n ≘ 剧 http://chillercheck.com/application/logsheet.cfm?ChillerlD=136 CHILLERCHECK.COM ຼ ao ເດ s n ಕ യഗ SIL a) ~ ¥⊨ Evaporator D ی ب A a a -Sheet for Chiller e E a a E d Φ 165 9 E G 163% 음 \_0g 0 = Tools #5 Internet Explorer **a** 8 8 **a** Chiller Favorites × v မေ လ လ A ddr 0001 e E d Main CONT'D ON FIG.8-1 Address Sheet-Microsoft ChillerCheck ب ب e E d View - • E 4 = - $\stackrel{\frown}{\sim}$ efficiency analysis, click on the Edit D To view Reading Back 00 Û 0

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Inventor Lawrence J Seigel

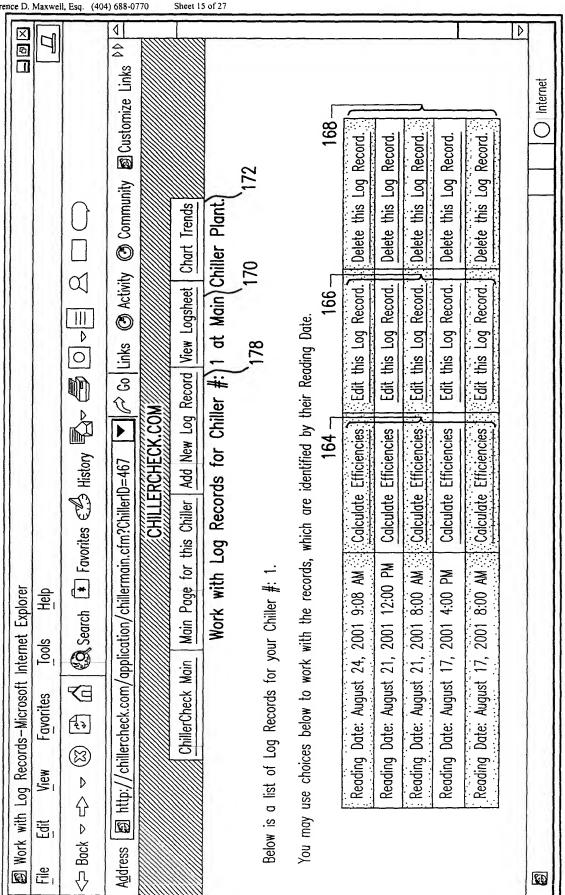
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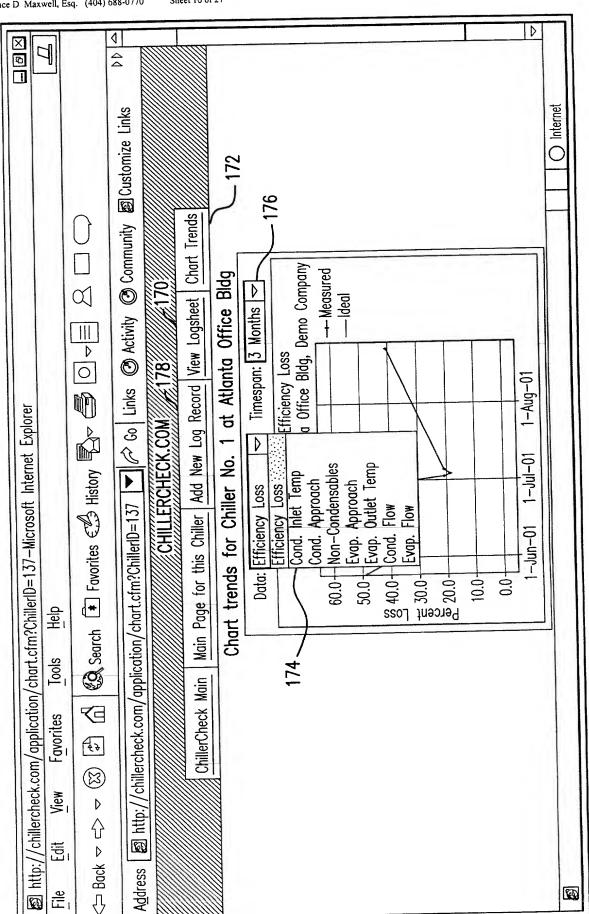
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ChillerCheck Main Main Page for this Chiller Add New Log Record View Logsheet | Chart Trends

Add a Log Record for Chiller #: 1 at Main Chiller Plant. 178

Please enter your readings into the form below, then click the "Add Record" button:

Log Record

Operator:	Tim	
Reading Date:	August 24, 2001	_180
Reading Time:	9:32 AM	182
Condenser Re	eadings	
Inlet Water Temp:	°F 184	
Outlet Water Temp:	°F 186	
Refrigerant Temp:	°F 188	
Condenser Pressure:	PSIG 190	
Actual Condenser Water Pressure Drop:	PSIG 192	
Evaporator Re		
Inlet Water Temp:	°F 194	
Outlet Water Temp:	°F 196	
Refrigerant Temp:	°F 198	
Evaporator Pressure:	In. Hg. 200	
Actual Chill Water Pressure Drop:	PSIG 202	

FIG. 11A

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Compressor F	Readinas
Oil Pressure (High):	lb. 204
Oil Sump Temp:	F 206
Oil Level:	208
Bearing Temp:	°F 210
Run Hours:	_212
Purge Pumpout Time:	214
Electrical Red	adings
Amps Phase 1:	216
Amps Phase 2:	218
Amps Phase 3:	
Volts Phase 1:	_222
Volts Phase 2:	
Volts Phase 3:	
Operator No	otes
228	4
Add Log Red	cord230

FIG. 11B

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Chart Trends #1 Main Page | Maint. Records | Add Maint. Record | Add Log Record | View Logsheet Efficiency (Calculation for Chiller #1 at Admin Bldg.) Reading taken on October 10, 2001 at 1:50 PM -ERCHECK.COM 11,410 65,993 20.9% 54,583 of Efficiency Loss Efficiency Loss Target Cost to Run for Year Actual Cost to Run for Year Results 165 Cost 163 Chiller ChillerCheck Main

232 232 Solution 6,222 5,187 Cost Your Condenser Water Flow is 3.6% below design. Detailed Cost of Efficiency Loss 11.4% 9.5% Efficiency Loss Problem Non-condensables - Condenser Condenser 1 Fouled Tubes

Your Evaporator Water Flow is 21.9% below design.

an electrical imbalance that may be decreasing the performance of your Chiller. The voltage imbalance is 3.62%. .∞ There

The % load at this reading time was 88.9%.

Back to the main page for this Chiller.

min ne 49.1 2 00 82 93

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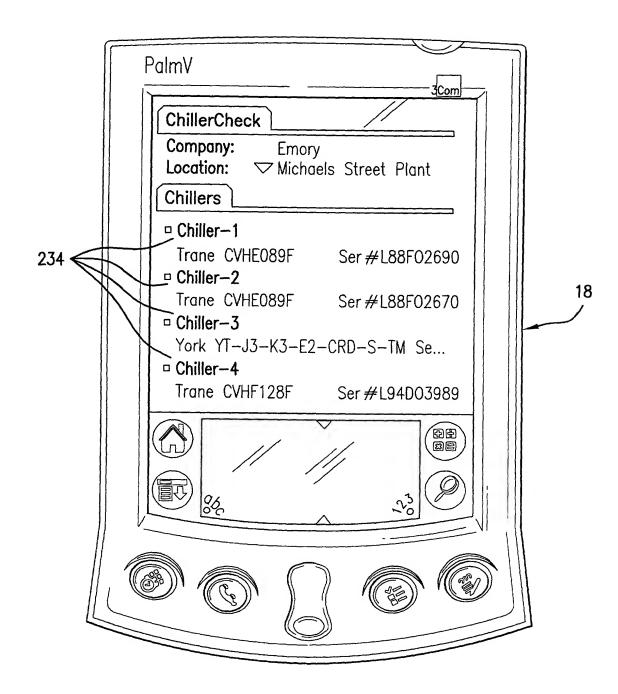


FIG.13

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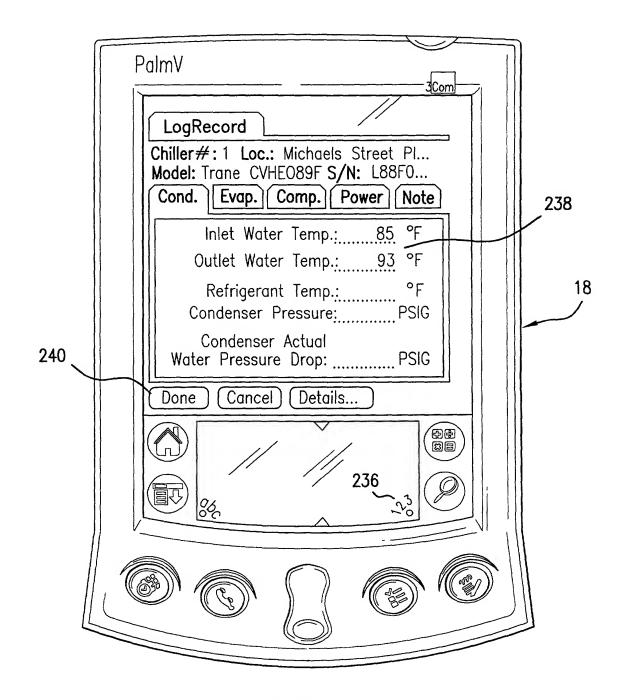


FIG.14

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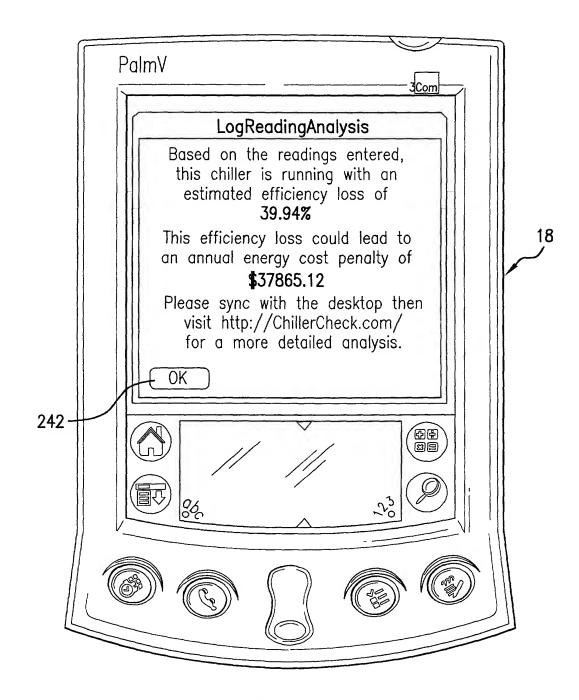


FIG.15

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"METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY

OF AN AIR CONDITIONING APPARATUS"

10/034,785 Serial No.: 03237.0001U2 Docket No.:

Filing Date: Contact:

December 27, 2001

Lawrence D Maxwell, Esq (404) 688-0770

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Trends ChillerCheck Main | Chiller #1 Main Page | Maint. Records | Add Maint. Record | Add Log Record | View Logsheet

Add Maintenance (Record for Chiller #1 at Admin Bldg.
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Please fill in all information in the form below, then click the "Add Maintenance Record" button.

You will then be taken back to the Maintenance page for this chiller.

## Maintenance Information

Oil Change Date: Select a Month    Day    Year      Date Oil Added: Select a Month    Day    Year      Quantity of Oil Added (Gallons):
---

CONT'D ON FIG.16A-1 FIG. 16A

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## CONT'D FROM FIG.16A

Eddy Current Tests						
Eddy Current Test Date (Condenser):	Select a Month Day Vear					
Eddy Current Test Date (Evaporator):	Select a Month 🗢 Day 🗢 Year 🗢					
Major Stop Inspec	tion (compressor teardown)					
Major Stop Inspection:	Select a Month 🗢 Day 🗢 Year 🗢					
Refrige	rant Maintenance					
Refrigerant Analysis Date:	Select a Month 🗢 Day 🗢 Year 🗢					
Date Refrigerant Added:	Select a Month 🗢 Day 🗢 Year 🗢					
Quantity of Refrigerant Added: (Pounds):						
Tu	ube Cleaning					
Condenser Tube Cleaning Date:	Select a Month 🕶 Day 🔝 Year 🔝					
Evaporator Tube Cleaning Date:	Select a Month 🔝 Day 🔝 Year 🔝					
Purg	e Maintenance					
Purge Tank Reclaim Date:	Select a Month 🗢 Day 🗢 Year 🗢					
Purge Run Time Reading When Tank Reclaimed:						

CONT'D ON FIG.16B

FIG. 16A-1

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CON	NT'D FROM FIG.16A-1	
Purge Filter Dryer Change Date:	Select a Month Day Year	
M	ajor Repairs	
Major Repair Date:	Select a Month 🗢 Day 🗢 Year 🗢	
Major Repair Description:		4   P
	Notes	
Maintenance Notes: (You may enter a note about any type of maintenance):		4
Add Mai	intenance Record	

FIG. 16B

Inventor: Lawrence J. Seigel

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**Irends** Chart ChillerCheck Main | Chiller #1 Main Page | Maint. Records | Add Maint. Record | Add Log Record | View Logsheet

Maintenance(Records for(Chiller #: 1 at Admin Bldg. 163

Below is a list of the most recent Maintenance Operations for your Chiller #1. You may click on the name of Maintenance Type to view all records of that type.

Most Recent Maintenance								teardown)		
Most Recen	October 18, 2001	Oil Maintenance	Oil Change: October 18, 2001	Oil Analysis: October 1, 2001	Eddy Current Tests	September 9, 2001	September 10, 2001	Major Stop Inspection (compressor teardown)	Major Stop: January 3, 2000	
Maintenance Type	Annual Maintenance: October 18, 2001		Oil Change:	Oil Analysis:		Condenser Eddy Current: September 9, 2001	Evaporator Eddy Current: September 10, 2001	Major Stop	Major Stop:	

CONT'D ON FIG.17-1

Inventor:

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## CONT'D FROM FIG.17

	Refrigerant Maintenance					
Refrigerant Analysis:	January 3, 2000					
Refrigerant Added:	August 23, 2001 — Quantity: 100 Pounds					
	Tube Cleaning					
Condenser Tube Cleaning:	October 19, 2001					
Evaporator Tube Cleaning:	February 5, 2000					
	Purge Maintenance					
Purge Tank Reclaim:	February 7, 2001 — Purge Run Time at Change: 1212123					
	Major Repairs					
<u>Major Repair:</u>	Major Repair: April 4, 2000 Repair Description: motor burnout					
	Maintenance Notes					
Notes:	November 5, 2001 Note: starter problems resulted in burnout					

FIG. 17-1